BAREILLY INTERNATIONAL UNIVERSITY, BAREILLY

Evaluation of Endonasal Endoscopic and Laser Assisted Dacryocystorhinostomy

By

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This is to certify that the facilities for the research work entitled **"Evaluation of Endonasal Endoscopic and laser Assisted Dacryocystorhinostomy"** allotted to **Abhinav Srivastava** under my direct supervision and guidance do exist in the department of Otorhinolaryngology, Faculty of Medical Sciences.

I will ensure the authenticity of the thesis protocol topic and research methodology which conforms to the standards of Bareilly International University.

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DECLARATION BY THE CANDIDATE

I hereby declare that this thesis protocol entitled **"Evaluation of Endonasal Endoscopic and laser Assisted Dacryocystorhinostomy"** will be a bonafide and genuine research work carried out by me under the supervision of **Dr. Chander Mohan** for partial fulfilment of the regulations for the Award of the degree of **Doctor of Philosophy** in **Otorhinolaryngology**.

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Introduction

Dacryocystitis is an inflammation of the lacrimal sac often as a result of infection. It leads to obstruction to the flow of tears from the eye to the nose thereby causing epiphora. Sometimes it leads to recurrent infection of the nasolacrimal system, causing purulent discharge from eye and swelling of the lacrimal region[1]. Chronic Dacryocystitis accounts for 87.1% of epiphora cases[2].

Untreated Dacryocystitis never undergoes spontaneous resolution as in due course of time with repeated and persistent infection the wall of the sac become atonic and contents can be evacuated only by the external pressure. If untreated it may lead to lacrimal abscess and fistula, chronic conjunctivitis, corneal ulcer, orbital cellulitis and thrombophlebitis and cavernous sinus thrombosis and Panopthalmitis.

The treatment of the condition is re-establishment of lacrimal passage in the nose known as Dacryocystorhinostomy(DCR). For years, External Dacryocystorhinostomy(DCR) has been the gold standard of treatment of this condition. With the advancement in endoscopic and Light Amplification by Stimulated Emission of Radiation (LASER) technology, endonasal and transcanalicular approach has become increasingly popular in past two decades. Cosmesis, Short recovery time, lower risk of morbidity and lack of impairment of the orbicularis oculi pump mechanism are some of the advantages offered by minimally invasive approach over conventional external DCR[3].

The success of DCR depends on a number of factors but the important factor is the final size of the ostium in the lacrimal sac just anterior to the middle turbinate, which in turn depends on the complete exposure of the lacrimal sac. Any local obstructive pathology such as Deviated Nasal Septum(DNS), Rhinosinusitis, Antrochoanal Polyp can hinder the complete exposure of the lacrimal sac and act as a contributory factor for the failure of DCR. So, a proper preoperative evaluation is necessary for selecting the case for the surgery. The

obstructive pathology, if present should be treated in the same or different sitting before contemplating DCR.

Killian in 1889, first described intranasal DCR and later, Caldwell in 1893, was the first to perform intranasal DCR but soon abandoned due to difficulty in visualization and numerous complications, and later it was modified by West and Halle[4]. Since the past two decades, endoscopic procedures has gained wide popularity. Due to technical advancement and endonasal route is accepted cosmetically. Success rate of the procedure is reported to be up to 90%[5].

A number of modifications using laser have been described as a useful tool in endoscopic DCR. Most commonly used Lasers are Holmium:Yttrium-Aluminium-Garnet(Ho:YAG), Argon, Carbon dioxide, Potassium –titanium-phosphate(KTP), Neodymium:YAG (Nd:YAG), Erbium:YAG (Er:YAG) and Diode laser. Among these, Diode laser is one of the most useful laser as it ablates the bone and the mucosa of the nasal cavity with less collateral damage[6] and minimal residual thermal damage to the target tissue. The use of diode laser for Endolaser DCR was first reported by Eloy et al. in 2000[7], and Fernandez et al. in 2004[8].

Success of surgery depends entirely on the amount and way of tissue handling. Any tissue injury heals by fibrosis. So, a tool is required which causes minimal tissue damage and also gives good haemostasis. Conventional endoscopic surgery works on the principle of precise tissue handling but many a times increased tissue damage may cause complications. Use of microdrill for the removal of lacrimal bone increases thermal injury and burning of bone and also increases risk of accidental slippage of burr and damage to adjoining structures.

So, a tool is needed having properties of precision, excellent haemostasis, minimal collateral damage and less thermal injury. LASER is one of the good tool and among different types of laser, Diode fits best as it has all the mentioned properties.

The proposed study has been planned to evaluate the surgical outcome of Dacryocystorhinostomy (DCR) using Diode laser and comparing it with conventional endoscopic DCR using cold instruments, and to assess the superiority of one over the other.

Review of Literature

Kong YT et al (1994)[9] performed 131 endoscopic Dacryocystorhinostomy(DCR) with holmium:YAG and contact neodymium:YAG lasers and followed patients for longer than 3 months. They found 77.2% success and 95.7 % in revision cases.

Metson R et al (1994)[10] assessed success rate of holmium:yttrium aluminium garnet(holmium:YAG) in 46 patients, and found 85% success rate. Holmium:YAG has properties of fibreoptic delivery, effective bone cutting, and precise soft-tissue coagulation.

Szubin L et al (1999)[11] in 31 endonasal DCR using either holmium:YAG or argon:HGM laser and found 97%success rate in a mean follow up of 16 months. They also suggested large rhinostomy size and simultaneous correction of intranasal and/or sinus pathology if present.

Moore WM et al (2002)[12] performed endosurgical DCR in 36 patients and endolaser DCR in 33 patients using holmium:YAG. They found success rate of 83% percent among endosurgical group and 71% successful outcome in endolaser group. They concluded Endoscopic endonasal DCR performed surgically had better results than those with holmium:YAG laser though it wasn't statistically significant.

Nayak DR et al(2005)[13] analysed 38 cases of Chronic Dacryocystitis during a period of seven years. 26 of them underwent endoscopic DCR and remaining 12 KTP assisted endoscopic DCR. They observed 80.76% success in patients who underwent Endoscopic DCR whereas 75% successful outcome was seen in those who underwent laser assisted Endoscopic DCR.

Panwar SS et al(2006)[14] did endoscopic DCR (EDCR) in 69 cases and Laser assisted endoscopic DCR (LAEDCR) using KTP laser in 18 cases. They found a success rate of 85% and 83% in EDCR and LAEDCR respectively at three months follow up.

Maini S et al.(2008)[15] studied 126 adult patients of Chronic Dacryocystitis. Out of these 60 underwent endonasal laser DCR with KTP laser and 66 endonasal surgical DCR. They found 82% and 68% success rate at three and twelve months respectively in laser group whereas, it was 76% and 74% at three and twelve months respectively in the surgical group. Overall, long term results were better in the surgical group though it wasn't statistically significant.

Derya K et al.(2013)[16] performed DCR on 55 patients. Out of which 29 underwent external DCR and remaining 26 endolaser DCR using Diode laser. They reported success rate of 86% in patients undergoing conventional DCR and 68% endolaser DCR. However, this result wasn't statistically significant.

Virendra KP et al(2013)[17] in a study on transcanalicular endoscope combined laser-assisted DCR (T-ECLAD) on 60 chronic Dacryocystistis patients using Diode laser found that it prevents unwanted collateral heating of the probe, and residual thermal damage to the target tissue. Moreover, they found that increasing the size more than 5mm was difficult by transcanalicular approach because of limited range of movement.

Aim and Objectives

Aim

Analysing the aetio-pathogenesis, anatomical variations and surgical outcome of Dacryocystorhinostomy(DCR) by Endoscopic and Diode Laser assisted Endonasal Technique.

Objectives

1. To study the various causes and demographic profile associated with Chronic Dacryocystitis.
2. To study various anatomic variations and challenges encountered during both the procedures.
3. To study the post-op comfort score and sequelae in the two groups.

Material and Methods

Place of Study: Department of Otorhinolaryngology and Head-Neck Surgery, Rohilkhand Medical college and Hospital, Bareilly, a tertiary care hospital in Western Uttar Pradesh.

Type of Study: Randomised prospective interventional study

Study Duration: One year (From 1st April 2019 to 31st March 2020)

Subjects: Clinically diagnosed cases of Chronic Dacryocystitis willing to participate in the study.

Sample Size: A total of 50 diagnosed cases of chronic Dacryocystitis.

Formula used is $4PQ/d^2$

P is the proportion of Chronic Dacryocystitis cases as per study, in the study selected 87.1% of epiphora cases were diagnosed as Chronic Dacryocystitis[1]

Q= 1-P

d= Allowable error, in the present study we have taken as 10%.

So the calculation is 4x .87x.13/ .01=45.24

Inclusion Criteria: All cases of Chronic Dacryocystitis fulfilling following criteria:

1. Age above 18 years
2. Willing to participate in the study

Exclusion Criteria:

1. Age less than 18 years
2. Not willing to participate in the study
3. Revision DCR surgery
4. Canalicular or common canalicular blockage on syringing
5. Craniofacial anomaly
6. Suspicion of Lacrimal Malignancy
7. Any mass in Nose and Paranasal Sinus

Intervention/Procedure: All the clinically diagnosed cases of Chronic Dacryocystitis were randomly divided into two groups by odd even method. One group will undergo DCR by Endonasal surgical route and the other group laser assisted DCR using Diode LASER as the tool.

Statistical Analysis: The data will be entered on a Microsoft Excel spreadsheet and imported into Statistical Package for Social Sciences (SPSS) version 22 for Statistical analysis. Data will be analysed by applying frequency, percentage, Mean, Standard Deviation. Chi Square will be applied for quantitative analysis and paired t test for the pre and post operative results.

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Annexure-I

Proforma for the proposed Study

Name:

Age: .....Years **Sex:** Male / Female

Address:

Mobile:

Occupation:

Urban/ Rural:

Religion: Hindu / Muslim / Christian / Sikh

Duration of the Condition: .....Years.....Months

Side of Disease: Left / Right / Bilateral

Side to be operated: Left / Right

Application of kajal/ Soorma: Yes / No

If yes, Home made / Commercial

Type of fuel used for cooking(Past/ Present):

Smoke (.....Hours/Day..... Years) / Smokeless (.....Hours/Day.....Years)

Nasal Examination: Normal / DNS Left or Right

History of Trauma: Yes / No

History of Allergy: Yes / No

Type of Anaesthesia: GA / LA

Method of DCR: Endonasal Endoscopic / Endonasal Laser Assisted

Intra-op Findings

Agger Nasi: Present / Absent

Distance of Lacrimal bone from Axilla of Middle turbinate:..... mm

Condition of Lacrimal Sac: Normal / Fibrosed / Fibrosed and contracted

Condition of wall of Lacrimal Sac: Fibrosed / Fibrosed and Thickened / Normal

Size of Lacrimal Opening made: ..... mm

Average Time: .....Hours.....Minutes

Bleeding: Minimal / Mild / Moderate / Severe

Pain Score(VAS): 1 2 3 4 5 6 7 8 9 10

Lacrimal Syringing: Free Flow / Partially Patent / Free Flow

Insertion of Lacrimal Stent: Yes / No

Post-op Nasal packing: Yes / No

Post-op Follow up

Post-op day	7th day	1st Month	3rd Month
Pain (VAS) 1 to 10			
Crusting (None, Minimal, Mild, Moderate)			
Size of Rhinostomy site (in mm)			
Shape of Rhinostomy (Circular/ Oval/ Slit like/ No opening)			
Lacrimal Syringing (Free Flow/ Partially patent/ Not Patent)			

Date:

Signature

Annexure-II

INFORMED CONSENT FROM

I have been informed about the surgical procedure of Dacryocystorhinostomy (DCR) by LASER (Diode) and conventional surgery. The possible complications of both also have been explained by the surgeon.

I hereby consent voluntarily to participate as a study subject.

(Signature/Thumb Print of patient/Parent/Guardian)

Full name of the patient.....

Signature of Candidate.....

Date:

Place:

सूचित स्वीकृति–पत्र

मुझे मेरे आँख के नासूर का ऑपरेशन (DCR) पारंपरिक एवं लेजर (Diode) विधि द्वारा किये जाने के बारे में सूचित किया गया है। इन ऑपरेशन के संभवतः दुष्परिणाम के बारे में डॉक्टर द्वारा समझाया गया है।

मै पूर्ण रूप से इस प्रक्रिया में भाग लेने की अनुमति देता/देती हूँ।

मरीज के हस्ताक्षर/अंगूठे का निशान

नामः–

उम्मीदवार का हस्ताक्षरः–

दिनांकः–

स्थानः–